Production of radio stations and a lightning detector system A. S. Popov

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As is known, in the spring of 1895 A. S. Popov invented two devices: a receiver suitable for two-way radio communication, and a light detector for automatically recording electromagnetic signals of atmospheric origin onto a paper tape. A detailed description of both devices was given to them in an article dated December 15, 1895 and published in the first issue of the Journal of the Russian Physicochemical Society for 1896. In domestic and foreign literature, starting from the end of the 19th century, it was repeatedly noted that the scheme of coherence A. S. Popov's receiver became a classic and formed the basis of the receiving equipment of the first generation wireless telegraph.

Already in November 1897, the French entrepreneur and engineer, the owner of the physical equipment workshop in Paris, E. Ducretet, according to the published description and scheme, manufactured Popov's coherer receiver and transmitter based on the widely known G. Herz vibrator. Ducrethe demonstrated the operation of these devices during reports at meetings of the French Physical Society on November 19, 1897 and January 21, 1898. The reports themselves were published in the Works of the Physical Society. The January report and its translation into Russian are included in the documentary collection [1]. In his report, E. Ducreta literally said the following:

> *"We have all the elements necessary for carrying out a telegraph without wires on hertz waves. It is enough for the sensitive relay to turn on the electromagnet of the recording device and for electric waves to be emitted and transmitted through space through short or long discharges in accordance with the Morse code. At the same time, the relay turns on electromagnet malleus, which shakes the dust radio conductor* ***(ie coherer Branly -.. Lodge - auth.)*** *. Thus automatically each wave, which has reached the unit, causing a current Upland aschayuschy radio conductor resistance in the initial state. In practice, it is enough to pick up the power of the transmitter, respectively, to the distance that we want to block.*
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> *The device described and built in 1895 by Professor A. Popov was designed exactly like that; it was used to receive electric waves excited by atmospheric discharges, and to transmit long-distance telegraph signals recorded by the receiver ... "*

It must be said that the Ducreté company had experience in manufacturing a number of functional units of the equipment, including the most labor-intensive part of the transmitter, the Rumkorf coil, which, as E. Ducrete noted in his report, provided a voltage of up to 200,000 V to power the Hertz vibrator. Further, the speaker compares the results of the experiments of A. S. Popov and G. Marconi:

"The distances achieved in the first experiments ***(at sea - bus)*** of Popov were 1,500 m, then 5 km above the sea with a vertical insulated wire 18 m high ***(that is, an antenna - bus)*** . Popov's work never "G. Marconi received a range of 5, 16 and 23 km with masts of 25, 30 and 36 m in height; the apparatus used had the same power as the ones I had the honor to show you."

Concluding his report, E. Ducreté emphasized: "our French industry and, in particular, my enterprise are not dependent on foreign industry." The last remark was very significant in connection with the intention of E. Ducuret to start the production of radio equipment, which should have the necessary patent purity, which was reliably provided by the article published by A. Popov in the Journal of the RFHO No. 1896.

The words of E. Ducreta about his independence from foreign industry should be understood in the aspect of patent protection of the sample prepared by him for production, because he did not intend to refuse the scientific and technical leadership of the Russian scientist. On the contrary, soon an intensive correspondence was established between them, and in the process of production E. Ducuret received written consultations of A. S. Popov, as evidenced by more than 200 original documents stored in the funds of the A. S. Popov Memorial Museum of the St. Petersburg State Electrotechnical Institute: letters from a French entrepreneur and draft answers by A. S. Popov.

Already at the end of the next 1898, the company E. Ducreté began small-scale production of radio stations of the A. S. Popov system, fulfilling orders from the naval departments of Russia and France. For Russia, the company manufactured a total of about 50 ship radio stations [2]. And after 1900, the radio set included a new, so-called telephone dispatch receiver, which has increased sensitivity and was patented by A. S. Popov in Russia, England and France. The dates of the English patent by A. S. Popov are noteworthy: it was declared on February 12, 1900, issued on April 7 of the same year, i.e. less than two months it took the British Patent Office to examine Popov's invention, which is a kind of record. (For comparison, recall that the application of Marconi was considered by the same department for more than a year: from June 2, 1896 to July 2, 1897.) The efforts to patent a telephone receiver in France at the request of A. S. Popov were taken over by E. Ducreta. The surname "Popov - Ducurete" as companions was indicated on the serial production plate. A model radio station in action was shown at the 1900 World's Fair in Paris and was awarded the Grand Gold Medal.

In 1900, A. S. Popov received several more proposals for the joint production of equipment for his system. One of them, received from France, A.S. Popov did not accept, since he had already collaborated with E. Ducreté. Another proposal came from the agent of the company Marconi James Vilenkin from London, who tried to get in touch with A.S. Popov through V.A. Triumfov, the head of the wired telegraph and telephone in Tsarskoye Selo - a suburban residence of the Russian emperor. In a letter dated November 15, D. Vilenkin rebukes V. A. Triumfov: "Unfortunately you have not brought me to Mr. Popov (the inventor of the wireless telegraph) ... Marconi company wants to exploit its patent in Russia, but in order to two homogeneous inventions do not compete, wants to enter into an agreement and act together on certain conditions ... " We do not know,

Since the first version of the equipment of A. S. Popov, which he described in print at the beginning of 1896, was not patented and, moreover, had no fundamental differences from the equipment protected by the English patent, G. Marconi, some firms believed that they produced precisely the equipment of Popov and not Marconi. In this regard, a characteristic article appeared on September 11, 1901 in the American newspaper "The North American" (Philadelphia), which reported on the production by the local company of the radio station of the system of A. S. Popov, finalized by Professor Henry Shoemaker, with the help of which establish a connection to 262 miles, which significantly exceeded the capabilities of the G. Marconi equipment available there. The author, who met with A.S. Popov in Kronstadt, cited a portrait of a Russian scientist, a diagram and a snapshot of his equipment, emphasizing the priority of A.S.

As for the lightning detector, the second device of A. S. Popov, it was only known about its practical application that one instance of this device was used for systematic observations at the Forest Institute weather station in St. Petersburg, and a professor of physics conducted his research in Tomsk F. Ya. Kapustin (the device was preserved and exhibited at the local museum), two more samples were demonstrated and were awarded honorary diplomas at the exhibitions: Nizhny Novgorod Art and Industry (1896) and Paris world, dedicated to the change of centuries (1900). In all cases, the Kronstadt Diving Workshop of the Kolbasyev brothers was engaged in their production on a special order. The recent publication by the vice president of the Historical Section of the South African Society of Electrical Engineers D. D. was of great interest. Vermulen titled "Popov Lightning Detector? - In South Africa!" [3].

In the article, an African scientist talks about his find - a lightning detector, found among the obsolete equipment of the Johannesburg Observatory. In terms of the appearance of the product and the plate placed on it, it follows that this is a serial production device manufactured in Budapest in 1904 by Hoser Victor. The researcher points out some of the details of the design, compares it with the description of the A. Popov lightning detector and finds great similarities between them. So, the coherer of the "African" lightning detector has disk contacts with metal powder according to the Branly coherer type, however, there is enough clearance between the disks and the glass tube to fill the tube with metal filings, which implements Popov's idea. The recording drum rotates from the clock spring mechanism. By its size and design, it resembles the drum of the Richard brothers with a weekly revolution, used in the first version of the A. Popov light-stripping device (in subsequent models, Alexander Stepanovich went on to record atmospheric perturbations on a telegraph tape). The African lightning detector drum makes one revolution per hour, after which, together with the paper attached to it, it moves 2 mm along the axis, while the writing pen leaves a spiral mark. In conclusion, Vermulen notes:

"Even nine years after the first production of the device by Popov, despite any changes in production ..., it is clear that this device is based on the original work of Popov." Popova (in subsequent models, Alexander Stepanovich went on to record atmospheric perturbations on a telegraph tape). The African lightning detector drum makes one revolution per hour, after which, together with the paper attached to it, it moves 2 mm along the axis, while the writing pen leaves a spiral mark. In conclusion, Vermulen notes: "Even nine years after the first production of the device by Popov, despite any changes in production ..., it is clear that this device is based on the original work of Popov." Popova (in subsequent models, Alexander Stepanovich went on to record atmospheric perturbations on a telegraph tape). The African lightning detector drum makes one revolution per hour, after which, together with the paper attached to it, it moves 2 mm along the axis, while the writing pen leaves a spiral mark. In conclusion, Vermulen notes: "Even nine years after the first production of the device by Popov, despite any changes in production ..., it is clear that this device is based on the original work of Popov."

Following the tradition of physicists around the world, A.S. Popov did not patent his first radio receiver and his lightning detector, as G. Herz did not take patents for the famous vibrator, V. Roentgen for a transmission apparatus, F. Brown for an electronic oscilloscope, etc. ., thereby creating the possibility of their duty-free production in all countries. Previously, we attributed Popov's noble step only to his receiver, not knowing about the mass production of a light detector by a Hungarian company. Now, after a find in South Africa, this can also be said in relation to the second device of A. S. Popov - his lightning detector.

Literature

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The article was published in the journal "Telecommunication" No. 1, 2002, p. 47.
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